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A Modern Theory of Air Defense Operations*

by Colonel General G. Zimin
Candidate of Military Sciences

Under modern conditions, the determination of the effective forms and methods for defeating large groupings of enemy aerospace forces takes on particular urgency. Soviet military art regards air defense operations as one such form. However, at the present time, when technology is developing rapidly and there are changes and improvements in enemy means and methods of aerospace attack and in the organization of air defense as well, it has become necessary to work out a new theory of air defense operations that will take into account not only the level and characteristics of the modern means and methods of combat but also the prospects for their further development and the tendency toward immeasurable growth of the role of air defense in war.

Because of its content and its scientific level, this theory must represent a new stage in the development of operational art of the Air Defense Troops of the Country. The director and faculty of the Military Command Academy of Air Defense understood this to be their task when they set about developing a theory of modern air defense operations through a special research war game.

The concept and plan of this game have been approved by the Commander-in-Chief of the Air Defense Troops of the Country. The leading directorates and departments of the Main Staff of the Air Defense Troops of the Country, the generals and staff officers of formations, and a number of scientific-research institutions will participate directly in developing a new theory of air defense operations. The research, which we estimate will require three years, is planned in three stages. The first stage lasted more than six months and is already completed; it included the development and partial testing of general fundamentals of modern air defense operations.

During this stage, a carefully planned theoretical study of various aspects of the general problem was carried out, as

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well as a systematic discussion at scientific seminars of individual conclusions; and, finally, a collation of the results and testing through a two-stage war game. We strove not only to determine the theoretical bases of modern air defense operations but also to mold the new planning methodology developed at the academy and to test it under practical conditions, taking into account the latest achievements of science and technology and a series of new recommendations for perfecting methods of troops control.

This article sets forth some basic results of our research.

First of all, as a result of a comparison and analysis of facts, it was established that the burgeoning development of varied means of attack in recent years has made it necessary to resolve questions of the defense of our country not only against aerodynamic means of attack but also against ballistic missiles and, in the future, against space weapons. Thus, as regards its role, its missions, and the composition of its means, the modern system of air defense has outgrown its former limits and has assumed a largely new character, that of aerospace defense. The latter circumstance requires that we refine the content of our concepts touching on the nature of actions of the Air Defense Troops of the Country.

Taking this into account, during the first stage major attention was devoted to working out a unity of views in defining the concepts of "aerospace defense operations of the Air Defense Forces of the Country."

After thorough discussion, we arrived at the following definition: an aerospace defense operation is the sum total of the battles and engagements fought by troops in accordance with a single concept and plan for the purpose of destroying the enemy means for an aerospace attack and of solving the operational-tactical problems of the air defense of our country. This type of operation may be carried out by an Air Defense formation or a group of Air Defense formations.

In defining an aerospace defense operation, it became necessary to establish a single meaning for such concepts as "battle", "engagement", and "combat actions". In our view, we may take the following definitions as a point of departure.

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Battle (boy) refers to combat actions by subunits and units for the purpose of destroying an enemy in the air and in space. Battle is carried out by units and subunits of arms of troops.

Engagement (srazheniye) means the sum total of combat actions bound together from the viewpoint of target, time and space, in the mission of destroying the aerospace enemy and of resolving operational-tactical problems. An engagement is carried out by Air Defense large units and formations.

Combat actions (boyevoye deystviye) of the Air Defense Troops of the Country are actions taken to destroy the means of an enemy aerospace attack in order to prevent strikes from being mounted against defended areas and installations and to prevent air and space reconnaissance from being conducted.

As already noted, these definitions were taken as a point of departure. It is possible that they may be further refined in the course of subsequent research.

The further development of questions regarding the fight against enemy means of aerospace attack represents a complex scientific-theoretical problem. The tenets of general methodology, i.e. Marxist-Leninist philosophy, its logical methods and principles are very important in the successful resolution of this task. Such an approach is by no means an attempt to substitute general philosophical reasoning for specialized scientific research, or to use general philosophical methods or the methods of logic in place of the specialized methods of military science. The application of general methodology in this case will help us find a more correct way, the shortest distance to our research goal; and it will assist us in formulating a system of methods in line with this research.

The categories of content and form have important methodological significance in working out a theory of aerospace defense operations. As is known, content is the sum total of elements forming a thing or an event. Combat actions of Air Defense formations and groups of formations, like all events and processes, represent a dialectic unity of content and form. The content of the combat actions of Air Defense formations and groups of formations is the sum total of engagements and battles.

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Content has a definite organization, structure, and way of expression. This is the role of form. Form cannot be arbitrary, however. Content demands a form which corresponds to it. Form represents the means of correlating the elements forming a thing (event) and the distribution of these elements in space and time. Since engagements and battles are the elements forming the combat actions of Air Defense formations and groups of formations, defining the form of these operations means finding a way of correlating engagements and battles and their congruence in space and time.

One content may have more than one corresponding method of correlation, i.e., more than one form. Depending on the nature of the actions of enemy aerospace forces, there may be two such methods, i.e., two forms of combat actions by Air Defense Troops of the Country. One of these is individual battles and engagements not unified by any common concept. But there can also be a means of correlating battles and engagements, and distributing them in space and time, in which they have the same single concept and plan--to destroy the enemy means of aerospace attack and to prevent strikes against the territory of our country. This method of correlation, i.e. this form, is the aerospace defense operation.

Marxist-Leninist philosophy orients military science toward the utilization of those methods, out of the complete range of methods of scientific knowledge, which correspond to the objective conditions, goals, and missions of a given research undertaking. The method of extrapolation may be used to some extent in developing a theory of aerospace defense operations, allowing general theoretical conclusions to be drawn on the basis of relatively few facts. In this case the conclusions apply to unresearched but analogous facts. Such a method is used to study not only single events but also multiple groups of events. When the question is one of extrapolating from this or that scientific principle, what is really being decided is its interpretation and the limits of its application.

Thus, the principles of the theory of the military art of conducting operations by Ground Forces, Air Forces, and the Navy must apply to the actions of the Air Defense Troops of the Country.

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Extrapolation may be made along two lines. First, combat actions of formations in the three branches of the armed forces named above, as well as combat actions of the Air Defense Troops of the Country, have actions and engagements as their content. Consequently, their form can be an operation, i.e., this method of correlating and combining battles and engagements when they share a single concept and plan.

Second, if an operation is viewed as an event of armed warfare, then this event in formations of Ground Troops, Air Forces, and the Navy, shares common traits, elements, and aspects with the actions of formations of Air Defense Troops of the Country.

On the basis of a detailed review of the type and characteristics of combat operations of formations and groups of formations of Air Defense in missile/nuclear as well as non-nuclear war, it has been established that these operations have all the traits common to modern military operations carried out by the three branches of the armed forces named above. These traits are:

- target determination;

- large (operational or strategic) scope, in terms of forces participating and of the area dimensions of combat actions;

- subordination of troop actions of large units and formations to a single concept and plan;

- mass use of nuclear weapons for mounting a decisive attack against the enemy and for fulfilling the main objectives;

- breakdown of general tasks into individual ones; precise planning of the time factor and sequence of the fulfilment of objectives;

- variety and complexity of the measures for comprehensive support of combat actions.

As applied to aerospace defense operations, these traits, while retaining their basic content, acquire a certain specificity which can be traced to target determination and the mass use of nuclear weapons for fulfilling the main objectives. 50X1-HUM

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Target determination in aerospace defense operations arises from the need to deliver a crushing blow against the aerospace enemy as far as possible from the borders of our country and from the areas and installations defended by Air Defense troops. As research has shown, these goals can only be achieved through a strong concentration of the Air Defense Troops of the Country on the perimeter defense line and through the massive use of nuclear weapons as the main means of defeating an aerospace enemy.

It is known that in the official view of the leaders of military circles abroad, the main objectives of aerospace operations will be fulfilled by the surprise massive use of all modern means of destruction, above all the means of mass destruction.

It is impossible to determine exactly what weapons the enemy intends to use in a surprise attack. Under such conditions, the penetration into our air space of any enemy grouping, even a small one, represents a great threat, not only to individual installations but also to the widespread areas of the country. It follows from this that the Air Defense Troops of the Country must ensure the total defeat of any enemy air groupings at perimeter defense lines, as far as possible from vital areas and installations. We calculate that this can be accomplished only through the massive use of nuclear weapons by Air Defense troops.

Under present-day conditions, in order to repulse strikes by large groupings of enemy aerospace forces, especially along the main strategic axes, it is necessary to concentrate the forces of several operational Air Defense formations and to ensure close coordination between them and the troops and forces of other branches of the armed forces, especially the Ground Forces and the Navy. Therefore, the theory of aerospace defense operations must include the principles and methods of coordination among the forces of all branches of the armed forces.

We have established that all the distinctive traits of military operations and their contemporary interpretation are also fully characteristic of aerospace defense operations. But these common traits do not, and naturally cannot, include all the specifics in the preparation and conduct of operations by the Air Defense Troops of the Country which, together with the traits common to military operations in general, also have their own particular qualities:

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- the extraordinarily fast pace of combat actions, which produces rapid and sudden changes in the aerospace situation in widespread areas and limits the possibilities for Air Defense forces and means to maneuver while repulsing enemy strikes;

- the need for virtual simultaneous commitment to action of the main Air Defense forces (large units and formations of the second echelons must be committed almost simultaneously with the troops of the first echelon);

- the command system and the groupings of Air Defense Troops of the Country which will carry out the operation are created and developed over an extended period of time long before the start of the war. This permits careful planning for many alternatives during the process of preparation, and allows troop control to be effected during the operation on the basis of variants, previously worked out and perfected with troops, for the conduct of engagements and battles.

The presence of specific traits is also characteristic of operations of all the other branches of the armed forces, and the more thoroughly the traits are known, the more specific the theory of conducting operations will be and the better the theory will light the way in actual practice. Therefore, one of the urgent tasks of modern research is to discover and substantiate all of the specific traits and characteristics of modern aerospace defense operations.

Despite the specificity and variety in the tasks to be fulfilled by formations and groups of formations of Air Defense, we must consider the principal common goal of any aerospace defense operation to be the destruction of the forces and means of an aerospace enemy and the prevention of an enemy breakthrough with these forces and means to defended areas and installations and into the depth of our country.

This main goal will be achieved by fulfilling a series of specific tasks assigned to each formation, the fulfilment of which will constitute the content of an aerospace defense operation.

The operational objectives of troops of a specific Air Defense formation will depend on the importance of the air-strategic

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axis; the operational position of the formation in the overall air defense system; the significance, quantity, and location of defended installations and areas within the formation's boundaries; the expected nature of enemy actions; the conditions of coordination with front and naval forces; and even the stage of the war. Because of this, the tasks of various Air Defense formations in operations will be different, and a theoretical plan can thus concern itself only with general tasks of aerospace defense operations.

Proceeding from the situation examined in the war game, we formed the conviction that the first operation of an individual Air Defense formation must, as a rule, be a component part of the general strategic aerospace defense operation being carried on by all Air Defense troops in a particular theater of military operations. An Air Defense formation may conduct subsequent operations as a component part of groups of formations, as well as independently in coordination with Air Defense forces and means of a front and fleet. In the theory of operational art, defensive operations are characterized by basic indicators reflecting the possibilities and concepts for setting up and implementing defense.

Taking this into account, it is recognized that aerospace defense operations may be characterized by the following features: the scale of the operation (formation or group of formations); the operational structure of troops (number of echelons and zones for destruction of the enemy along each axis); the distribution of operational capabilities along axes and zones; the extent of destruction of the air enemy in zones; the relative capabilities of both sides along axes and zones; and the planned duration of operations.

All of these indicators can be relatively sharply defined, and, in our view, they characterize the essence of the subject quite clearly.

The question of the duration of an aerospace defense operation has evoked many debates and conflicting opinions during the research war game. This is quite natural, since it is very difficult to predict the duration of such an operation (as it is with all defensive operations). But at the same time it is necessary to set definite time limits for guidance in planning the sequence of troop actions and in determining the amount of

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reserves of materiel and combat means and the outlay of resources. If this is not done, the planning loses all specificity. Therefore, in our war game the duration of the first operation of an Air Defense formation was about the same as the first aerospace operation of the enemy, this assumption deriving from studies conducted by our probable enemy in recent years and from the use of the method of modeling.

The antiair defense of the country, as a nationwide system, is not organized in a single act but is actually created and developed constantly during peacetime. But it must be prepared at all times to repulse the strikes of an aerospace enemy, i.e., to successfully fulfil the objectives of the first aerospace defense operation.

Accordingly, one of the top priority tasks of our research was to select those of the many measures for the advance organization of air defense which apply exclusively to the preparation of aerospace defense operations and which comprise the content of these operations.

Our research showed that the basic purpose of the preparatory measures for an aerospace defense operation by Air Defense formations is to ensure conditions for effective realization of the capabilities of the Air Defense troop groupings and fulfilment of the objectives of formations under all probable conditions of a war started by an enemy, and of any and all conceivable enemy operations. These conditions are created by comprehensive, sound, advance planning for the operation and for the training of troops and staffs in carrying out the concept of its conduct.

Thus, when we speak of the preparation of an aerospace defense operation we mean that part of the general complex of measures, carried out during the advance organization of air defense, which is related to the development of a single concept for conducting battles and engagements in a given period of a war, and to the training of troops and control organs for the complete implementation of this concept.

As with all defense operations, the planning for troop actions in an aerospace defense operation must have several variants, taking into account enemy actions and the possible ways in which the war may start. Consequently, the principal content in

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planning an operation is the development of the most expedient variants of actions for formations and groups of formations of the Air Defense Troops of the Country.

Our analysis showed that each of the variants for conducting an aerospace defense operation must be distinguished by the following specific traits: clearly established axes and lines of concentration of the main Air Defense forces and a specific procedure for the use of antiaircraft missiles with nuclear charges (at which stages of the operation, against which enemy echelons and groupings, on which axes, in which zones, and what portion of these missiles to use); advance planning and practical testing of maneuver variants for fighter aircraft and established composition of reserves and procedure for using them.

In our research particular attention was devoted to developing scientifically sound methods of decision-making by the commander and to planning aerospace defense operations.

After detailed analysis of the historically developing methodology of making military decisions and planning operations, we do not reject the value and the practical timeliness of this methodology; but we are convinced that, considering the specific nature of the preparation and organization of modern air defense and the necessity of using a large arsenal of scientific methods in organizing it, the previously developed methodology is no longer fully responsive to the demands of further raising the scientific level of the leadership of the Air Defense Troops of the Country, and does not allow for the use of all the new achievements of science, and must therefore be made more precise and detailed.

In our view, the main factors calling for review of the methodology which has developed are the necessity and possibility of working out decisions and plans for aerospace defense operations by using a modeling method and performing a quantitative evaluation of the results of the possible variants of actions of the opposing sides; and the fact that the chain of command of the operations elements cannot in effect exert a direct and decisive influence on the course of combat actions because of the rapidity with which battles and engagements take place.

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The situation has now developed wherein it is necessary to resolve the main tasks in the control of troop actions in an aerospace defense operation in advance, even before the beginning of the operation. Once the operation has begun, however, all that can be done is the partial refinement of variants worked out earlier.

On the basis of the situation as it actually develops, it is necessary to carry out timely buildup of strength for creating a favorable alignment of forces on the necessary axes in order to fulfil completely the assigned combat task. This raises demands for a higher scientific level and quality in the advance planning of operations of the Air Defense Troops of the Country and requires the application of operations research methods and of a modeling method which must be used as one of the main methods of working out decisions and planning.

This conclusion is very important from the viewpoint of perfecting and systemizing methods of military planning. Up to the present, dozens of methods have been developed for the solution of individual problems for evaluating a situation through the use of modeling, each of the methods actually proposes modeling of enemy actions and those of our own troops. Naturally the question has arisen: Can we not create a single methodology for working out decisions, one which will enable us to resolve in a single complex all problems concerning situation evaluation and planning? Our research has convinced us that such a methodology can be created and worked out in the form of an appropriate "heuristic program."

Heuristic programming is that scientific line which allows us to apply the appropriate methods and known patterns of creative processes in developing programs for making expedient decisions directly, without sorting out and evaluating all possible variants of actions and contingencies. In our view, the use of heuristic programming methods can have great practical significance in military administration and in the training of command personnel.

An attempt was made in our academy to work out solutions and plans for aerospace defense operations on a rational basis, applying the modeling method and heuristic elements. The attempt provided for the following: the systemization of tasks and all elements of situation evaluation into a single program; the

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continual refinement of previously made solutions in order to optimize them with the aid of a good system of scientifically sound criteria of air defense effectiveness, viability, and economy, and of the feasibility of completing the planned measures within the established time limits; the substantiation of positions originally put forth as hypotheses (particularly conclusions drawn from estimates of the enemy); and the isolation of the main questions forming the essence of the general concept of successful fulfilment of operational tasks, and the subordination of all individual solutions to the demands of carrying out this general concept.

Having analyzed all of the purely creative actions connected with working out decisions and planning for an aerospace defense operation, we reached the conclusion that the preparation of such an operation is the culmination of a single process of air defense organization, while the working out of decisions and the planning of the operation comprise the main components of the general program of decision-making.

On the basis of our research, we came to the conclusion that the main problems connected with ensuring centralized control of Air Defense Troops of the Country during an operation are: first, the determination of the actual possibilities for direct control by the commander of a formation of battles and engagements carried out by Air Defense large units; and second, the establishment of tasks and functions of the commander and staff of an Air Defense formation for troop control during the operation, taking into account their actual possibilities for influencing the course and outcome of battles and engagements.

The scientific development of these problems is extremely important, not only for the theory of aerospace defense operations but also for the perfection of our system of controlling the Air Defense Troops of the Country. From theoretical analysis and practical testing in a war game, we are convinced that, because of the quickened tempo of the combat actions of Air Defense units and large units, the possibilities for the chains of command of operations elements to exert direct influence on the course of battles and engagements will be relatively limited. This circumstance necessitates clear definition of the specific content of the activities of formation commanders and staffs during an aerospace defense operation. 50X1-HUM

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Extensive research has shown that under present conditions the main tasks in the direct control of the combat actions of antiaircraft missile troops and fighter aviation must be resolved at the tactical levels of control. During aerospace defense operations the operational levels of Air Defense troop control must resolve tasks of a different nature, primarily the refinement of previously developed variants for conducting an operation; the creation of a favorable balance of forces for forthcoming actions; and tasks associated with ensuring the security of defended areas and installations of their own troops and of the population; and other strictly operational tasks.

The war game has underlined once again that plans worked out in advance at the academy and published in the press, plans for the distribution of the tasks and functions of the various control levels of the Air Defense Troops of the Country, are correct in principle and sufficiently well founded. An interesting idea was put forth for increasing effectiveness in combat against an air enemy at low and very low altitudes by creating a special zone in the border area for the destruction of low-flying aircraft (to a depth of 800 to 1000 kilometers). It is advisable to create these zones by concentrating a large number of low-altitude antiair means and by making mass use by subunits of arms of troops of homing antiaircraft missiles of the "Strela-2" type.

Our calculuations indicate that by taking this action and by setting up intensive radio jamming, we can force enemy aircraft to operate at altitudes above 300 to 400 meters, which will appreciably facilitate the fulfilment of combat tasks by Air Defense troops.

In future stages of our research war game we intend to expand our results and make them more specific, and study questions of the preparation and conduct of aerospace defense operations by the troops of a group of Air Defense formations. In line with an approved plan for this work, we also intend to include the staffs of Air Defense formations and to conclude the research by conducting large-scale operational exercises.

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